APPENDIX F:
WEIGHTING ANALYSIS

The goal of this study was to achieve a baseline understanding of fire and EMS interoperability needs. However, the proportion of agency sizes and types that occurred in the final sample are not identical to those of the broader population. It is possible to correct for this by applying numerical weights to under- and over-represented categories to restore them to the proportions found in the total population.

In this survey effort, the population was divided into three groups: fire departments, EMS departments and special agencies. In addition, the fire and EMS departments were further divided by size. To determine the impact that weighting for unequal segment sampling and response rates has on the overall response data, a weighting analysis was performed. Numerical weights were applied to the sample data to restore segments in the sample to their proportion in the total population.

To determine sample weighting factors, the population segment proportions were divided by the sample segment proportions. This results in a factor required to restore the sample to proportions that are representative of the total population. Exhibit 54 summarizes the number of agencies and their proportions for each segment, both in the total population and the respondent sample, with the resulting weighting factor. A weighting factor less than one reduces the impact of a segment that is over-sampled, while weighting factors greater than one increase the impact of under-sampled groups. There is still an inherent risk, however, in assuming that the options and ideas expressed by the under-sampled groups accurately reflect those of their respective nationwide groups.

Agency Type/Size	National Population		Survey Sample		Weighting Factor
	N	Proportion of N	n	Proportion of n	
Fire Departments					
> 99	1,112	.0304	373	.3783	.0804
< 100	28,200	.7719	422	.4280	1.8035
EMS Departments					
> 99	309	.0085	61	.0619	.1373
< 100	6,596	.1805	86	.0872	2.0700
Special Agencies	317	.0087	44	.0446	.1951
Totals	36,534	1.0000	986	1.0000	

Exhibit 54
Weighting Factors by Agency Size and Type

Results were analyzed to determine if a weighted sample was significantly different more representative of the total population than the unweighted sample, making inferences to the broader population more reliable.

Based on the results of descriptive statistics determined for both the weighted and unweighted samples, the averages and standard deviations for a majority of the ordinal and dichotomous questions changed very little. The largest differences in the averages were on the questions dealing with the familiarity of Project 25 Standards (.33), the familiarity with FCC refarming efforts (.32) and the likelihood of adopting Project 25 Standards (.29). The weighted averages for each of these questions was slightly lower than for the unweighted sample. In addition statistical error for each question changed very little. Only one question in the weighted analysis (i.e., the use of paging for emergency alerting) exceeds the ± 5 percent maximum error rate established in the unweighted analysis.

Because analyses were also conducted across the varying types of fire departments (i.e., volunteer, paid, combination), a second weighting analysis was performed on these types of fire departments to restore relative population distributions. Exhibit 55 summarizes the numbers of agencies and their proportion for each fire department type, both in the total population and the respondent sample, with the resulting weighting factors.

Fire Department Type	National Population		Survey Sample		Weighting Factor
	N	Proportion of N	N	Proportion of n	
Volunteer	23,156	.7900	403	.5069	1.5585
Paid	5,276	.1800	254	.3195	.5634
Combination	879	.0300	136	.1711	.1753
Totals	29,312	1.0000	795	.9975	

Exhibit 55
Weighting Factors for Fire Department Types

The results of the second weighting analysis were similar to the first. Averages and standard deviations for a majority of the ordinal and dichotomous questions changed very little while the largest differences in the averages were on the questions dealing with the familiarity of Project 25 Standards (.23) and the familiarity with FCC refarming efforts (.23). The weighted averages for each of these questions was slightly lower than for the unweighted sample. However, several questions in both the weighted and unweighted sample exceeded the ± 5 percent error threshold established in the original overall analysis.

Although weighting an analysis attempts to restore relative population distribution in the sample, there is a risk in assuming that actual responses would follow the same trend. In addition, as the differences between the weighted and unweighted samples were minimal in both cases, the analyses performed in this study were conducted without weighting the cases.